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Two methods in bladder neck stenosis treatment efficiency: Holmium YAG laser and cold blade incision

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Abstract
Aim: In this study, we aimed to compare the efficacy of Holmium YAG laser (Ho YAG) and cold knife incision in the literature.
Material and Methods: Bladder neck stenosis was retrospectively screened in our hospital between January 2018 and January 2019. Recurrence time was defined as the maximum flow rate below 15 ml/s and/or when it became symptomatic. The patients were divided into two groups. The first group consisted of 14 patients with bladder neck stenosis who underwent cold knife procedure. The second group consisted of 17 patients with bladder neck stenosis who underwent Holmium laser.
Results: In the group where laser ablation was applied due to bladder neck stenosis, the postoperative 6th month maximum flow rate was significantly higher (p =, 001), while post voiding residual (PVR) values were significantly lower (p = 0.029). When the groups were compared in terms of flow rate and PVR, there was no significant difference in terms of urine flow rate and PVR at 3 months, respectively. Nevertheless, the flow rate and PVR amount at 6 months were statistically significant in favor of the laser ablation group.
Discussion: The use of holmium laser for bladder neck stenosis is promising in first-line treatment protocols with minimally invasive treatment modality, high success rates, low recurrence, and complication rates.

Keywords
Bladder neck; Stenosis; Holmium laser; Cold blade; Treatment

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Introduction

Benign Prostate Hyperplasia (BPH) is a histological diagnosis associated with lower urinary tract symptoms which incidence increases with age [1]; 25-30% of these files need treatment [2]. Medical treatments applied generally require improvement in patient symptoms until surgical treatment.

Transurethral Resection of the Prostate (TURP) is the gold standard treatment method for BPH treatment, with a success rate close to 90 % [3]. Common complications of the procedure include bleeding, infection, retrograde injection, urethral stricture, and incontinence [4]. Another complication observed at the same time after TURP procedure is bladder neck stenosis (BNS) and its incidence varies between 0-4.9% [5-7]. Although we have limited knowledge about BNS, which starts to appear 4-6 weeks after TURP and is considered as late complication, factors that play an etiological role, insufficient surgical technique, small adenoma, excessive resection, and large resection lobes are accused [5,8-10]. The lack of clear advice by the current guidelines and the recurrence potential of the disease cause problems in treatment. [10,11]. Some later definitions of bladder neck stenosis have been introduced by Marion and Bodian [12,13]. In the treatment, it is aimed to open the bladder neck to reduce urethral resistance. Transurethral resection can be done for this. However, it can trigger infection and recurrent scar formation.

In this study, we aimed to compare the effectiveness of Ho YAG laser and cold knife incision in our patients with BNS and to find it in the literature.

Material and Methods

Pre-study was approved by the local ethics committee. The patients was retrospectively screened in the category of countries diagnosed with bladder neck stenosis between January 2018 and January 2019. Patient consent was not obtained because it was a retrospective study. Patients who had TURP operation due to BPH were examined. Patients with urinary tract infections, who had undergone urological intervention, had undergone transvesical prostatectomy and those who had surgery for prostate cancer were excluded. Demographic documents and prostate volumes were reached in preparative countries. Intraoperative procedure time, post-operative, and post-operative transurethral (TU) probe duration, 3rd month and 6th month were included for uroflowmetric maximum flow rate and post voidingrezide (PVR) recordings. The times when the maximum flow rate was below 15ml/s and/or became symptomatic were described as the recurrence time. The patients were divided into two groups. The first group consisted of 14 patients with bladder neck stenosis who underwent the cold knife procedure. The second group included 17 patients who were intervened with Ho YAG laser.

Surgical Technique

Karl-Storz (Tuttlingen,Germany) brand internal urethrotome was used. The stenosis in the bladder neck was cut until the fibrotic tissue ended. In the other group, with 21 French cystoscopy sets (Hamburg, Germany) Olympus brand, 562 nmHo YAG (Quanta, Milan, Italy) laserablation mode, 10 Hz and 2 J energy was ablated. TU was placed at the end. Surgical procedures were performed under spinal anesthesia.

Statistics Method

Data were analyzed with SPSS 25.0 version (SPSS®, IL, USA) software. The compliance of the data with the normal distribution curve was evaluated with the Shapiro-Wilk test, the Mann-Whitney U test was used for the comparison of two groups with non-normal distribution, whereas the Wilcoxon test was used for the comparison of paired and non-normal distributed data. Nominal categorical data were assessed with the Chi-square test. P <0.05 was considered significant.

Results

The mean age of all countries was 68.6 ± 1.26 (51-79) years, and Body Mass Index (BMI) was 26.06 ± 0.49 (21-34). There was no difference in age, BMI, American Society of Anesthesiologists (ASA) score, comorbid disease history, hospitalization time, prostate volume, relationship rate, preopmak urine flow rate, post-op 3rd- month max urine flow rates, preop pvr, postop (Tables 1,2).

Laser ablation options in the group at the postop 6th month max. PVR value was found to be significantly lower (p = 0.029). When the groups were compared in terms of flow rate and PVR, there was no significant difference in terms of urine flow rate and PVR at 3 months, respectively. Nevertheless, the flow rate and PVR amount at 6 months were statistically significant in favor of the laser ablation group. (p <0.001) (Table 3).

Table 1. Comparison of demographic characteristics between groups

	Cold Blade	Laser	p
Number of patients n	14	17	
Age (years)	68.6± 7.6	68.7± 6.8	0.860
BMI m^2/kg	26.43±3.1	25.7±2.4	0.421
ASA score 1/2	7/7	6/11	0.409¥
Comorbid disease history Yes/no	6/8(57%)	9/8(47%)	0.576¥

¥: Chi-Square (X^2): , BMI: Body Mass Index

Table 2. Comprasion of operation data between groups

	Cold Blade	Laser	p
Hospitalization Time	1.14±0.3	1.12±0.3	0.922
Prostate V. mL±SD (mean rank)	73.1±37.3(16.4)	70.7±36.1(15.6)	0.799
Complication no/yes	10 (71.4%) / 4 (28.6%)	12 (70.6%) / 5 (29.4%)	0.959¥
Preop Q maksmL/sn±SD (meanrank)	7.36±2.6 (15.04)	7.82±2.3 (16.79)	0.597
Post op 3. month Q maksmL/sn±SD (mean rank)	26±3.9 (16.54)	25.76±3 (15.5)	0.769
Postop 6. month Q maksmL/sn±SD (meanrank)	16.57±4.7 (10.29)	22.59±4.4 (20.71)	.001
Preop PVRmL±SD (meanrank)	129.2±57.1(15.7)	130.1±48.4(16.1)	0.922
3 month PVRmL±SD (mean rank)	11.7±10.8 (15.4)	13.4±13.4(16.4)	0.769
6 month PVRmL±SD (mean rank)	59.3±26.7 (19.8)	40.8±22.5 (12.)	0.029

¥: Chi-Square (X^2): SD:standart deviation, Q maks: maximum current velocity , PVR: post voiding residü.

Table 3. Comparison of Q max and PVR values within the same surgery group

	Preop	3. month	6. month	p
Q maks				
Cold Blade	7.36±2.6	26±3,9	16.57±4.7	<0.001β
Laser	7.82±2.3	25.76±3	22.59±4.4	<0.001β
PVR				
Cold Blade	129.2±57.1(15.7)	11.7±10.8 (15.4)	59.3±26.7 (19.8)	<0.001β
Laser	130.1±48.4(16.1)	13.4±13.4(16.4)	40.8±22.5 (12.7)	<0.001β

β: wilcoxon, Q maks: maximum current velocity, PVR: post voiding residual

Discussion

Bladder neck stenosis, which is a complication observed after BPH surgery, occurs within the first 2 years after surgery. In BNS etiology, surgical procedures, prostate weight, history of diabetes, smoking and cardiovascular diseases are accused. [14]. Numerous methods are described in the literature for BNS treatment. There are various techniques such as urethral dilation, bladder neck incision, cytotoxic agent injection after incision, open reconstruction, urethral stents [15,16]. Uretral dilation is used as the first-line treatment modality in non-complete stenoses, but it has high recurrence rates. Bladder neck incision and / or resection can be performed by cystourethroscopy and endoscopic method in patients who do not want spark plug dilastation and / or recurrent bladder neck stenosis after spark plug replacement [17-19]. The cold-knife incision or cytotoxic agent injection described to reduce recurrence rates have potentially serious side effects that may result in anaphylaxis, extravasation, and bladder necrosis, or even cystectomy [14-20]. In our study, in the group where we applied Ho YAG laser ablation, only 2 patients at the end of the 6th month, and in the group of patients who underwent cold knife incision, the clinical recurrence was seen in 6 patients.

In the European Urology Guideline, the post-TURP BNS development rates were cooperated as 12.3% in the prostate volume below 80 g10. At a rechargeable small prostate volume (less than 20 g), this ratio is determined to be higher (16%) [22]. BNS can be a difficult process to manage among urologists due to its frequent repetition potential. There is a need for more frequent treatment in BNS and patients become symptomatic in a shorter time. In our study group, clinically recurrence was observed in only 2 rooms in which HoYAG laserablation was performed, and minimal fibrotic bands observed with flexiblsystoscopy under office conditions were opened and their clinical relief was provided. In the cold knife incision group, 6 observed clinical recurrences were resistant to the need for surgery. We believe that the Ho YAG laser with fibrotic colors delays almost complete ablation, or is therapeutic.

Mundy et al. They reported repairing the bladder neck with open surgical methods. They succeeded in 21 out of 23 patients with this method, but pointed out the necessity of using arterial urinary sphincters [23]. Wessells et al. have described primer excision of the bladder neck and urethroplasty with primer anastomosis and penil faciculo cutaneous flap or rectus philebia [24]. Ink probability has been reported to be high. For this reason, necessity of the last stage artificial sphincter should be considered. In the bladder neck mentioned above, the evaluation of urinary incontinence may develop in the areas where the spark plug, endoscopic incision, endoscopic excision and substance injection in the incision areas remaining in the clinical trial phase. In this case, it is recommended to wait at least 3 months for intervention in incontinence and to observe the steady state of the situation [25].

In our study, there was no significant difference between the two groups in the duration of the TU catheter, the length of hospital stay and the complications.

Planning of our study as a retrospective in a small patient room is considered as limitation.

Conclusions

The use of Ho-YAGlaser in the treatment of bladder neck stenosis is promising in first-line treatment protocols with its minimally invasive treatment modality, high success rates, low recurrence and complication rates. However, more comprehensive prospective studies are needed to determine the effectiveness of treatment methods.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

None of the authors received any type of financial support that could be considered potential conflict of interest regarding the manuscript or its submission.

References

1. Oelke M, Bachmann A, Descazeaud A, Emberton M, Gravas S, Michel MC, et al. EAU guidelines on the treatment and follow-up of non neurogenic male lower urinary tract symptoms including benign prostatic obstruction. Eur Urol.2013;64(1):118–40.

2. Levy A, Samraj GP. Benign prostatic hyperplasia: whento "watch and wait", when and how to treat. Cleve Clin J Med. 2007;4:15-20.

3. Holtgrewe HL, Mebust WK, Dowd JB, Cockett AT, Peters PC, Proctor C.Transurethral prostatectomy: Practiceaspects of the dominant operation in American Urology. J Urol. 1989;141(2):248–53.

4. Mebust WK, Holtgrewe HL, Cockett AT. K, Peters PC. Transurethral prostatectomy: immediate and postoperativ ecomplications. A cooperative study of 13 participating institutions evaluating 3885 patients. J Urol. 1989;141:243–75.

5. Roos NP, Wennberg JE, Malenka DJ, Fisher ES, McPherson K, Andersen TF, et al. Mortality and reoperation after open and transurethral resection of the prostate for benign prostatic hyperplasia. N Engl J Med. 1989;320(17):1120–4.

6. Li X, Pan JH, Liu QG, He P, Song SJ, Jiang T, et al. Selective transurethral resection of the prostate combined with transurethralincision of the bladder neck for bladder outlet obstruction in patient swith small volume benign prostate hyperplasia (BPH): a prospective randomizedstudy. PLoS One. 2013;8(5). DOI: 10.1371/journal.pone.00632277.

7. Skolarikos A, Rassweiler J, de la Rosette JJ, Alivizatos G1, Scoffone C4, Scarpa RM, et al. Safety and efficacy of bipolar versus monopolar transurethral resection of the prostate in patients with large prostates or severe lower urinary tract symptoms: post hoc analysis of a european multicenter randomized controlled trial. J Urol. 2016;195(3):677–84.

8. Küpeli S, Yilmaz E, Soygür T, Budak M. Randomize dstudy of transurethral resection of the prostate and combined transurethral resection and vaporization of the prostate as a the rapeutic alternative in men with benign prostatic hyperplasia. J Endourol. 2001;15(3):317–21.

9. Lee YH, Chiu AW, Huang JK. Comprehensive study of bladder neck contracture after transurethral resection of prostate. Urology. 2005;65(3):498–503.

10. Ahyai SA, Gilling P, Kaplan SA, Kuntz RM, Madersbacher S, Montorsi F, et al. Meta-analysis of functional outcomes and complications following transurethral procedures for lower urinary tract symptoms resulting from benign prostatic

enlargement. Eur Urol. 2010;58(3):384–97.
11. Rassweiler J, Teber D, Kuntz R, Hofmann R. Complications of transurethral resection of theprostate (TURP): incidence, management, andprevention. Eur Urol. 2006;50(5):969–80.
12. Bach T, Herrmann TRW, Cellarius C, Gross AJ. Bladder neck incisionusing a 70 W 2 micron continuous wave laser (RevoLix) World J Urol. 2007;25(3):263–7.
13. Marion G. Surgery of the neck of the bladder. Brit J Urol.1933;5: 351.
14.Bodian M. Someobservations on the pathology of congenital idiopathic bladder-neck obstruction. Br J Urol. 1957;29(4): 393.
15. Kaynar M, Gul M, Kucur M, Çelik E, Bugday SM, Goktas S. Necessity of routine histopathological evaluation subsequent to bladder neck contracture resection. Cent European J Urol. 2016;69(4):353–7.
16. Cindolo L, Marchioni M, Emiliani E, DE Francesco P, Primiceri G, Castellan P, et al. Bladder neck contracture after surgery for benign prostatic obstruction. Minerva Urol Nefrol. 2017;69(2):133–43.
17. Jack M, Ciril G, editors. Prostate Cancer. Scince and Clinical Pratice. Oxford: Langford; 2016.p.361-6.
18. Dalkin BL. Endoscopic evaluation and treatment of anastomotic strictures after radical retropubic prostatectomy. J Urol. 1996; 155(1): 206-8.
19. Surya BV, Provet J, Johanson KE, Brown J. Anastomotic strictures following radical prostatectomy. Risk factors and management. J Urol. 1990; 143(4): 755-8.
20. Breyer BN, McAninch JW. Opposingviews. Management of recalcitrant bladder neck contracture after radical prostatectomy for prostatecancer. Endoscopic and open surgery. J Urol. 2011; 185(2): 390-1.
21. Redshaw JD, Broghammer JA, Smith III TG, Voelzke BB, Erickson BA, McClung CD, et al. Intra lesional injection of mitomycin C at the time of transurethral incision of bladder neck contracture may offer limited benefit: TURNS Study Group. J Urol. 2015;193(2):587–92.
22. Chiu AW, Chen MT, Chang LS, Huang JK, Chen KK, Lin AT, at al. Prophylactic bladder neck incision in the treatment of small benign prostatic hyperplasia. Chin Med J.1990; 45(1):22–25.
23. Mundy AR, Andrich DE. Posterior urethral complications of the treatment of prostate cancer. BJU Int. 2012; 110(3): 304-25.

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